

Rebreather Meeting 2019 Ponza

Text by Peter Symes and Michael Menduno
Photos by Peter Symes and Marco Sieni





The sixth biannual international Rebreather Meeting took place 1-5 May 2019 on Ponza Island in Italy. Peter Symes and Michael Menduno report.

A More Pleasant Kind of Conference

Text by Peter Symes

Usually, when going to conferences, I would go the airport, jump on a plane, fly to some other country, go through customs and immigration, then hop in a taxi and check into some business hotel close to a conference or expo facility, usually placed in some nondescript business district some distance from a city centre and certainly not close to any water or diving. The next morning, I would then make my way to some conference centre where I would sit and listen to presentations all morning, have lunch and then listen to more presentations in the afternoon.

After a long day, I would typically go back to my

hotel room for a change of clothes and then attend a dinner or some other business event. The next day (or days), I would repeat the cycle until the end, after which I would check out of the hotel and go home. That is how the vast majority of the events and conferences I have attended over the past 25 years have unfolded—the same scheme, with some variations. But this one was pleasantly different.

First of all, the biannual rebreather meeting on the little and slightly remote but very picturesque Italian island of Ponza takes a little bit more effort to reach, but it is all very much worth the extra bother, which will become apparent in the following essay.

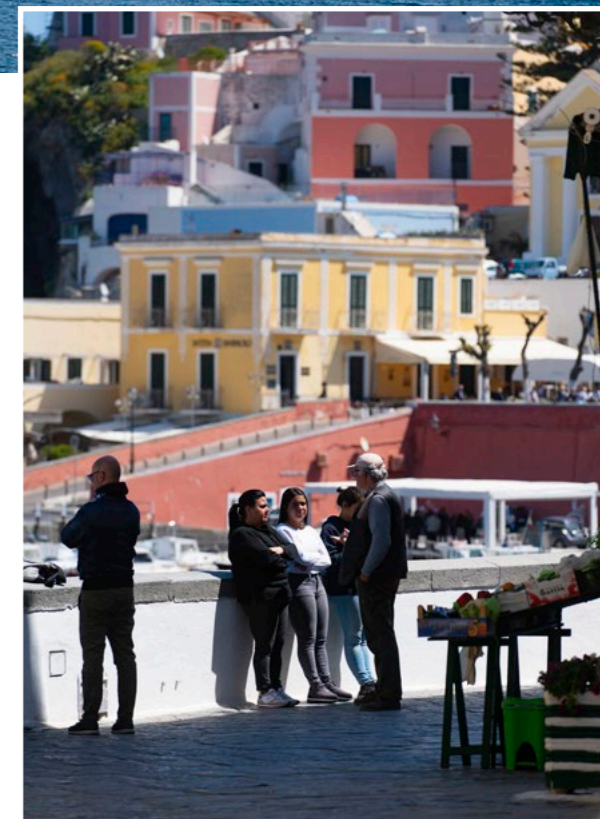
Getting there

It was one fine day in May when fellow colleague Michael Menduno and I flew down to Rome from our headquarters in Copenhagen on an early morning flight. The flight was uneventful, which was a positive. Once on the ground, we spent some residual time on an early lunch, comprising fresh salads, cheese and olives. Even in the airport, the snacks were made of fresh produce, unlike the mass-produced and factory-processed fast food from global brands you see in

most other places. Welcome to a classic foodie culture. That was a reassuring omen.

Soon enough, we easily found the train to the city centre, as the train station is connected to the terminal via some passageways. Once at Rome's main station, changing to the regional express train to Formia was quick and easy, as we just had to go around to another platform. No problemo.

After about an hour's train ride through the beautiful Italian countryside, we got off at Formia and made it from the station to the ferry terminal with all our bags in tow. The crossing took just about 1.5 hours before we set foot on the island of Ponza where we got



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On the dive boat, technical dive editor Michael Menduno chats with Dr Neal Pollock, research chair in hyperbaric and diving medicine at Université Laval (left)

Panorama of Ponza Island (top right) Delicious seafood (right) and desserts (above) were on the menu of social dinners held after conference presentations; The walkway around Ponza's colourful harbour (top left, far right and previous page)

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Ponza

Ponza at night (above); Dr Simon Mitchell, professor of anaesthesiology, University of Auckland, New Zealand, gives his presentation at the conference (left)

far from the frenzy and hustle and bustle of our everyday big city lives as well as the constant pressure of deadlines and expectations. Time seemed to flow differently here, in some undefined effortless and unhurried manner.

It is as if the island itself urges you to take a deep breath, reset your perspectives and reconsider your priorities in life. It is a place where you cannot help just enjoying your espresso, taking in its full flavour, there on the sunny terrace, or the whole meal, which easily takes all evening, without ever looking at your watch.

Diving

True to Italian form, Ponza Diving Centre's biannual Rebreather Meeting was unlike any other dive conference or event in which I have participated—and always one I thoroughly enjoy each time, for many good reasons. Let me explain.

First of all, on the agenda each morning was a boat dive, so the attendees get to dive together for a nice change, or at least enjoy some relaxed conversations on the spacious upper deck while travelling to and from the dive spots around the islands. Out on the boat, gastronomic speciali-

ties—tasters, snacks and dishes—are somehow continually being created in the diminutive galley and brought up on the sun deck where we tuck in while enjoying the vista over Mare Nostrum, or “our sea,” as the old Romans called the Mediterranean Sea.

During the transports to and from the dive locations, I found plenty of opportunities to have some proper and more in-depth conversations with various leading presenters. Many of them I already knew quite well from seeing them quite regularly at a number of other events—mostly technical diving conferences in the

United States, Europe or Asia. But on these other occasions, there never seemed to be any proper opportunities for decent conversation, due to the packed schedules of these events and the flurry of other people competing for each tiny sliver of attention.

The conference

Once the dive boat was docked in the port of Ponza,



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we usually had an hour or more to relax or just walk about in the labyrinthine maze of pathways between the buildings of Ponza town—a village that seems smeared across the steep hillsides, with winding walkways and narrow passages akin to a maze in a computer game. It was great fun just to walk around, and great exercise too, as going up and down inclines and steep stairs surely burnt off some calories.

Each afternoon, some three or four presentations were con-

ducted in what I believe was the civic centre. We sat in a hall that was mostly underground, which is not all that unusual on Ponza. Even our own little apartment was largely windowless, as it appeared to be dug halfway into a cliff. It was a bit strange, but no matter. The beds were comfy enough, and we did not really spend much time there, as there was a lot of socialising—mostly around great food—to be done.

The long and timeless evenings in good company were one of the



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Dr Neal Pollock on Ponza Diving Center's dive boat

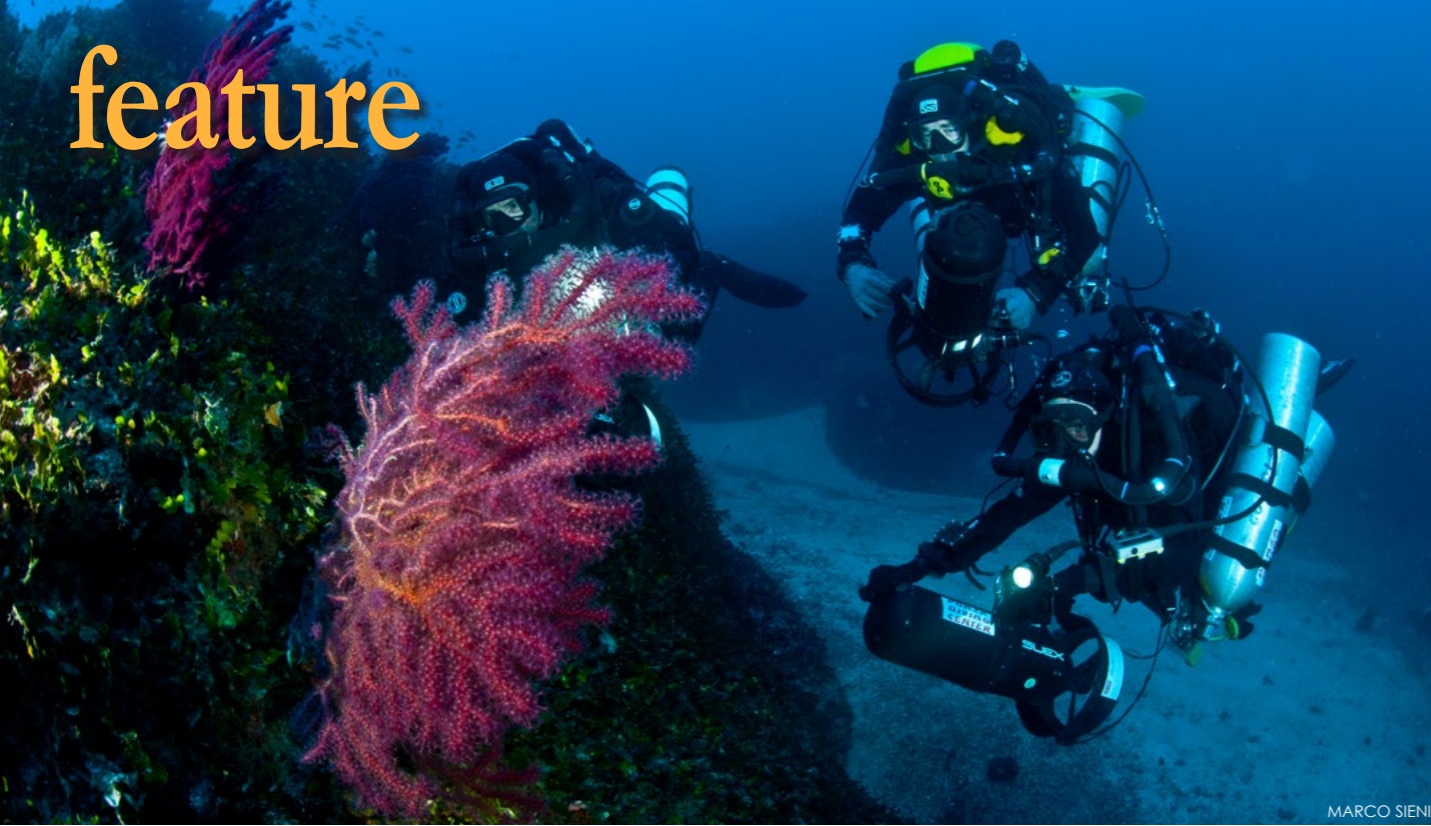
accommodated in a small apartment in one of the narrow streets just above Ponza Diving Centre.

Ponza Island

Ponza is simply beautiful and classic. The island just oozes of laid-back enjoyment of life, and a different and more meaningful pulse is almost tangible. The Mediterranean lifestyle, being firmly rooted in tradition and a very long history, is what seems to set the rhythm, at least to an outsider's point of view. Already in antiquity, some better-off Romans retreated to the island during summer.

Out here, we were pleasantly





Technical divers visited colorful reefs around Ponza (above and top right) before presentations began in the afternoon.

I have been to many places across the globe during my extensive tenure in the dive industry and attended literally hundreds of business events, but almost all of them are stiff and formal in comparison, and you never quite enjoy them. The relaxed dinners on Ponza, on the other hand, was a different matter altogether, because they were unpretentious and focused on socialising over some excellent food in the stimulating company of good colleagues.



Could other events elsewhere replicate this pleasant combination of diving, presentations and socialising? Not quite, because it is so tied to this specific locale and culture, which can never be transplanted. It would probably not be possible either to conduct any large events according to this overall framework. Firstly, there is obviously a limit to how many people a dive boat can carry, even a spacious one, but I suppose more than one vessel could be used. Secondly, the Ponza event is relatively small in size and somewhat exclusive in attendance, which makes it possible to socialise in the described manner. But I would like to see other gatherings take the idea to heart. ■

highlights of this event. Every evening, the whole bunch of us were taken to some great restaurant, every night a new one, to dine together and enjoy some fine Italian cooking. An image says more than a thousand words, as the old and quite overused saying goes, but I will let the accompanying photographs speak for themselves.



Ponza harbour at night (above); Conference participants enjoyed social dinners with fine wines (far left), delicious seafood (center) and fresh pasta dishes (left).



Ponza Island's picturesque harbor

Dive, Learn, Eat

Text by Michael Menduno

1 May 2019 — Nearly three dozen rebreather aficionados made the biannual trek to Ponza, Italy—a picturesque island in the Tyrrhenian Sea about a three-hour journey from Rome—for the sixth International Rebreather Meeting organized by Andrea Donato, owner of Ponza Diving Center, and his partner, Daniela Spaziani. The goal of the four-day meeting—which was sponsored by a number of manufacturers and organizations, including JJ CCR, Shearwater, DAN Europe, Società Italiana Medicina Subacquea ed Iperbarica (SIMSI), and the Italian rebreather users' association CCR Italia—was to provide the latest research and information to the

rebreather community.

"They're passionate tech divers, hungry for information," explained Dr Simon Mitchell, a professor of anesthesiology at the University of Auckland, New Zealand, who was one of the presenters. "That's what I love about these types of meetings. I am happy to be here and share what I know."

Taking a cue from the hyperbaric medical community, the meeting was organized to appeal to diver sensibilities: diving in the mornings (8:30 a.m.-2:00 p.m.), lectures and discussions in the afternoons (3:00-7:00 p.m.), followed by dinner and drinks (9:00-11:30 p.m.) in the evenings.

Dive right in

Donato and his crew did a masterful job of supporting more than 20 rebreather divers, bearing scooters, cameras and bailout bottles, along with

The biannual international Rebreather Meeting is organized by Andrea Donato (right), owner of Ponza Diving Center, and his partner, Daniela Spaziani (below)



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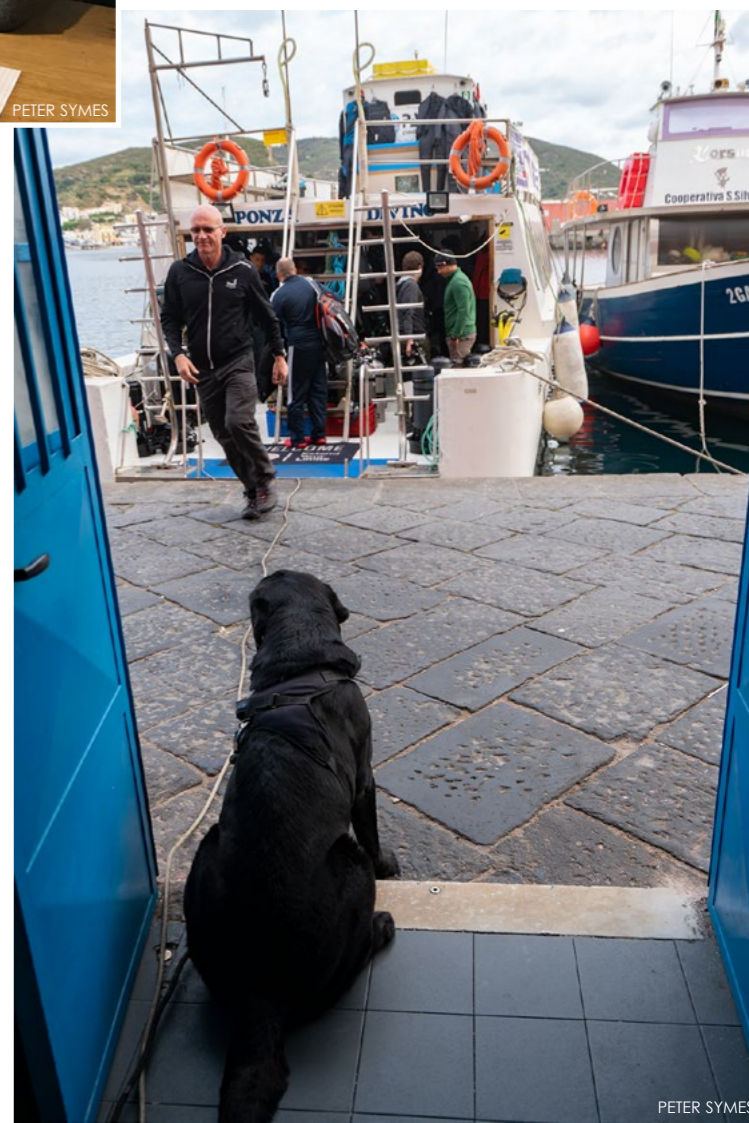
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a few open circuit divers, without incident. The operation felt both calm and relaxed, and ran flawlessly and safely, a testament to the team's skill and experience. They were helped by Ponza Diving's ubiquitous mascot, an amicable, large, black mastiff named Ugo.

The boat, which was docked just outside of the dive shop, headed out each morning around 8:30 a.m., as divers huddled over strong Italian coffee and fresh bread after prepping their rebreathers. Interestingly, as



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we were loading up the boat on the first day there, Donato made a point of warning Peter Symes, publisher of *X-Ray Mag*, and myself to go easy on the espresso. "It can kill you," he said,



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Ponza Diving's amiable mascot—a large, black mastiff named Ugo (far right)—looks on as the dive boat is loaded up with gear for a dive trip in the morning before conference presentations take place in the afternoon; Gastronomic specialties—appetizers, snacks and dishes—are somehow continuously created in the dive boat's little galley and served up on the sun deck (right); Before and after presentations, dining and socializing events were arranged at selected Ponza restaurants (above).



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Technical divers on dives conducted during the conference (above and right)

citing an American diver who had a heart attack underwater after consuming too many coffees. The boat then made its way to one of the numerous submerged seamounts, covered in soft corals, surrounding the island, where it would anchor for the morning dive.

Our morning dives were typically 165-261ft/50-80m deep, with one- to two-hour run times. Visibility was 50-65ft/15-20m, and water temperature was about 58-60°F/15-16°C. Following each dive, we were treated to a multicourse lunch, which usually included soup, fish, cephalopods, rice, pasta, bread, salad and dessert, along with the requisite pitcher of wine and more espresso. After lunch, the boat headed back to port, where we prepped gear for the next day's dive.

Where's the manzo, err... beef?

While rebreather diving in Ponza was clearly the attraction that brought people together, the meat of the meeting was the presentations given by some of the technical diving community's leading scientists, engineers and practitioners. Our group met in an old stone chapel up the hill from the dive shop. Headphones were available for sequential English and Italian translations.



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One of the themes that emerged from the meeting was the role of human factors, i.e. the way we process and act on and/or fail to act on information, and its impact on diving safety. This is a deep body of knowledge that was developed in the aviation, healthcare and other fields, and is now being applied to diving largely through the efforts of pioneer Gareth Lock at The Human Diver (Thehumandiver.com). Several of us noted the fact that human factors being

discussed in the absence of the seemingly ubiquitous Lock was a sign that this important work was beginning to gain traction. Here are some of the highlights:

Training does not work

Technical Diving International (TDI) Rebreather Instructor, Instructor Trainer and author Mark Powell began with a list of ten improvements in rebreather diving that he would like to see from a community perspective, things like bet-

Technical dive equipment loads up the dive boat (above); Mark Powell and Michael Menduno prepare rebreather equipment (center); Andrea Donato checks medical equipment (top center)

ter buoyancy control, the increased use of checklists, more attention to bailout planning, etc. He then asked the question, "Why hasn't training made a difference?" That is, why hasn't training produced permanent observable changes in divers' behavior in these areas? The answer, documented by numerous studies, is that humans aren't very good at retaining information. The solution: deliberate practice of essential skills.

"People tend to practice things they like and are good at, which is not very helpful," Powell explained, noting that practicing things that are very difficult to do doesn't work either. "The sweet spot," he said, "is practicing things that are challenging." He recommended that divers practice something on every dive! Sounded very GUE to me.

In-water recompression (IWR)

The use of in-water recompression to treat divers at remote locations has long been controversial, and until recently, the hyperbaric medical community has failed to reach a conclusion regarding its efficacy. But as Dr Simon Mitchell explained, the situation has now

changed as a result of a new paper, "In-Water Recompression,"¹ he coauthored with Dr David Doolette, a decompression physiologist at the US Navy Experimental Diving Unit (and GUE diver). The two were able to find evidence not previously reported that answers two key questions:

- Does early recompression improve outcomes? (i.e. recompressing an injured diver within minutes vs hours)
- Is shallower, shorter recompression effective? (Note that IWR typically compresses the diver on 100% oxygen to 30ft/9m vs. a USN Table 6 to 60ft/18m.)

Based on US Navy data derived in part from early research on treatment protocols, Mitchell and Doolette were able to answer both questions strongly in the affirmative. The new recommendation: A diver should be treated with IWR if a chamber is more than two hours away

¹ [HTTPS://WWW.NCBI.NLM.NIH.GOV/PMC/ARTICLES/PMC6156824/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6156824/)





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TDI instructor trainer Mark Powell giving his presentation (top center); Dr Simon Mitchell, professor of anesthesiology at the University of Auckland in New Zealand, was one of the presenters (left); Conference participants attended presentations in the afternoons (above); Ponza's harbor (below)

question: Is there a safety problem with rebreather diving?

Mitchell began by reviewing what we know about rebreather safety based on the ground-breaking 2012 paper by Dr Andrew Fock, "Analyzing recreational rebreather deaths 1998-2010,"³ namely: There were approximately 20 deaths per year for 2000-2010 from a population, which was then estimated to be about 18,000 rebreather divers based on agency certifications. That means that the fatality rate for rebreather diving was esti-

³ [HTTPS://WWW.NCBI.NLM.NIH.GOV/PUB-MED/23813461](https://www.ncbi.nlm.nih.gov/pub-med/23813461)

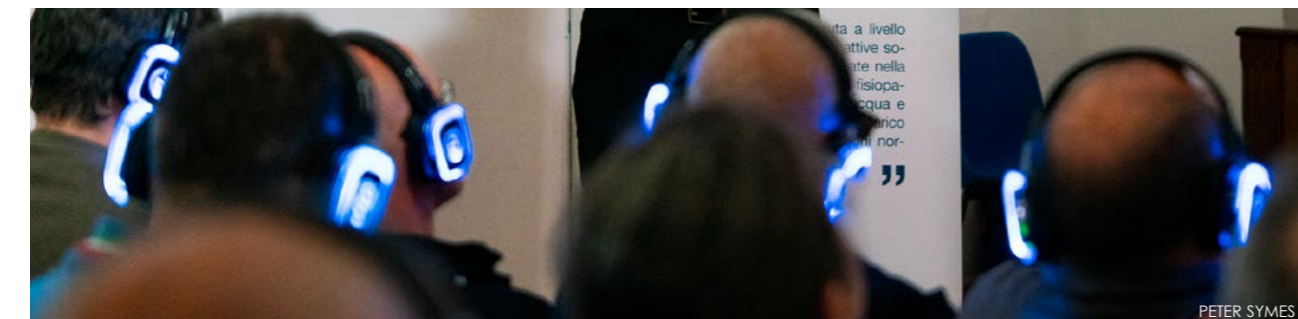
mated to be about 133 deaths/100,000 divers/year compared to about 16 deaths/100,000 divers/year for open circuit diving. The conclusion: Rebreather diving was about 10 times more hazardous than open circuit scuba. Note, there is currently a follow-up study underway to determine if things have improved.

Mitchell broke down the causes of rebreather fatalities into three buckets:

- Hazards of advanced diving
 - Rebreather equipment failures
 - Diver error and violations
- Overwhelmingly, most incidents arose



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Participants wore headphones for simultaneous translation to English or Italian (above); A discussion takes place during a presentation by Shearwater founder, Bruce Partridge (top left).

and the team is set up to provide IWR (i.e. has proper equipment, e.g. full face mask and training, support, environmental conditions and appropriate patent status).

Defensive dive profiling: Concerns for aging divers

Dr Neal Pollock, research chair in hyperbaric and diving medicine at Université Laval, gave a pair of eye-opening lectures on the potential long-term impacts of decompression stress and what can be done, and the prospects for aging divers. Was he talking about us?

Pollock began by citing studies² that found lesions in the brain and spinal cord have been observed with higher frequency in individuals with a history of

² [HTTPS://WWW.UHMS.ORG/IMAGES/DCS-AND-AGE-JOURNAL-WATCH/ERDEM_CEREBRAL_WHITE-MATTER.PDF](https://www.uhms.org/images/dcs-and-age-journal-watch/erdem_cerebral_white-matter.pdf)

repeated decompression stress. Bone lesions have also been found in commercial divers. The factors shown to increase the risk of dysbaric osteonecrosis in commercial divers were: a history of inadequate or experimental decompression, diving deeper than 165ft/50m, and a history of decompression sickness (DCS). The conclusion: While dysbaric osteonecrosis has largely been eliminated in commercial diving due to procedural changes, decompression stress poses a potential long-term risk factor for technical divers! Divers need to think about immediate and long-term risk.

As a result, Pollock, who is known for doing extra deco, encouraged divers to do longer shallow decompression, adding, "It can't hurt. It can only help." Specifically, he recommended several ways of adding conservatism: using conservative gradient factors, primarily

reducing GF-high, buffering the dive by slowing down on the final ascent to the surface following the last high PO₂ stop, delaying exercise post-dive, extending surface intervals to add more time for recovery, using appropriate gasses (Yes, "air is for tires!"), choosing appropriate partners with similar risk tolerances and maintaining good physical fitness.

The bottom line for aging divers: There is no upper age limit, though there may come a point where you may need greater support. Be forewarned! Note, there were several post 65-year-old divers making the plunge at Ponza!

Human factors in rebreather diving

Mitchell began by noting that human factors were the most important but also the hardest path to improving safety in rebreather diving. He then posed the



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Conference participants enjoyed conversation and cuisine at selected restaurants around Ponza each day (below); Colorful villas (bottom right) perch on the steep hillsides around Ponza Island (top left)

don't make mistakes." Checklists can be supported by training, practice and engineering.

Interestingly, after the meeting, I asked one of the Italian rebreather divers if he used a checklist on our dives. "My instructor taught me to do it by memory," the diver told me, "So, that is what I do. I haven't had any problems." And

therein lies the problem!

Bruce Partridge, founder of Shearwater Research, and explorer Edoardo Pavia, owner of Sea Dweller Divers, also gave individual presentations focused on understanding human factors and changing divers' behaviors. Partridge noted that there were approximately 600 failure modes

possible on a rebreather. However, only 40 were equipment-related; the remainder involve diver error.

DCI Research/ Telemedicine
Massimo "Max" Pieri, research supervisor for DAN Europe, discussed DAN's

research focusing on preventing decompression illness⁵ (DCI) using DAN's diving database of some 66,000 dives, ranging in depth from 16 to 628ft/5 to 192m, with an average depth of 100ft/30m. Some of the factors DAN's researchers have considered include: gradient factors, hydration, genetic disposition and hematological parameters. They are also conducting a decompression study with a local (Italian) GUE group with the help of GUE instructor Mario Arena, examining the efficacy of so-called "deep stops" versus shallow decompression profiles (see Dr David Doolette's post, "Gradient Factors in a Post-Deep Stop World"⁶).

Next, DAN Europe president, Dr Alessandro Marroni, discussed his visionary program

⁵ [HTTPS://WWW.NCBI.NLM.NIH.GOV/PUB-MED/28974936](https://www.ncbi.nlm.nih.gov/pubmed/28974936)

⁶ [HTTPS://BLOG.GUE.COM/GRADIENT-FACTORS-IN-A-POST-DEEP-STOPS-WORLD/](https://blog.gue.com/gradient-factors-in-a-post-deep-stops-world/)



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from diver errors (i.e. trying to do the right thing but doing the wrong thing) and violations (i.e. knowingly creating unnecessary risk of harm to yourself and others, and expecting to get away with it). "I have made errors and violations in my rebreather diving," Mitchell offered to the assembled group of divers, "and I bet you have too."

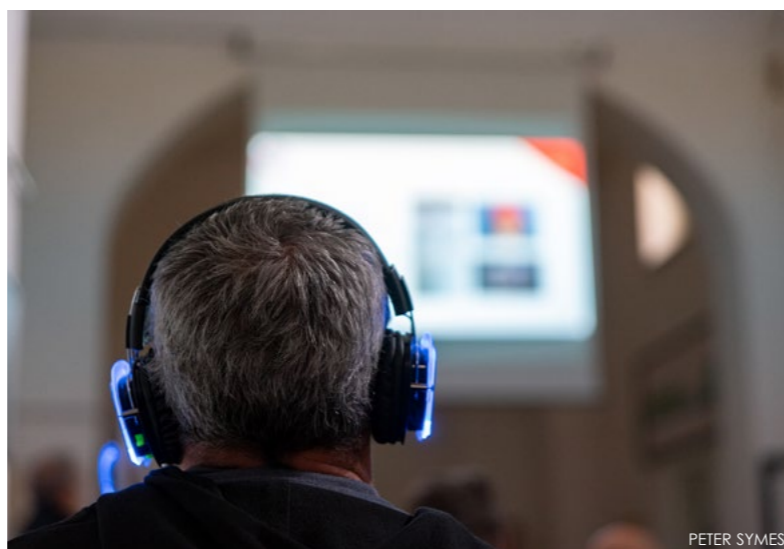
What's to be done? Mitchell reviewed several fatalities involving violations, like diving with two-year-old oxygen sensors, or using a type of sorb not specified by the manufacturer. He said that we needed to remove the motivation for violations. This involves a culture change: Make safe choices be seen as a strength versus a weakness. Training, mentoring and role modeling are critical in this regard.

Typical errors might include forgetting to analyze one's gas, forgetting to turn on the rebreather or open the oxygen valve, or

leaving out an O-ring on the scrubber. In fact, each of these errors have resulted in multiple fatalities.

Mitchell said that pre-dive checklists are the primary means for preventing errors. As a testament to the power, he cited a study analyzing the impact of using checklists in surgical suites: Deaths were reduced by 50 percent after the introduction of checklists and, as Mitchell pointed out, these were among highly trained professionals. He then cited a DAN study⁴ of some 2,041 dives examining

⁴ [HTTPS://ACADEMIC.OUP.COM/IJE/ARTICLE/45/1/223/2363549](https://academic.oup.com/ije/article/45/1/223/2363549)



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the impact of pre-dive checklist use on scuba mishaps: Mishaps, including rapid ascents, low or out-of-air situations, etc., were reduced by 36 percent.

Barriers to using checklists

First, misunderstanding about their purpose: Checklists are not meant to replace a manual! Second, arrogance or ignorance: thinking "I can do it from memory," or "I



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THIS PAGE: Ponza at night when social events at local restaurants gave conference participants a chance to mingle and enjoy fine dining, excellent wines and traditional fare, including steamed mussels and, of course, fresh pasta.



think Fitbits on steroids! Marroni described his vision of a DAN doctor able to assess a diver who is still in the water, and communicate directly with that diver via an underwater communications system. In fact, they have already tried out a prototype.

Dott. Pasquale Longobardi, president of SIMSI, also presented SIMSI's research examining the biochemical mechanisms involved in decompression stress. He con-

cluded with a set of best practices, namely to run PO₂s at 1.3 bar or less, maintain PN₂s at 3.16 bar (the equivalent of breathing air at 100ft/30m) or less, and run PHE as high as possible; Longobardi stated that helium in the form of trimix protects divers from oxidative stress (inflammation) compared to diving air (kick those tires again!). A medical colleague in the audience told me he had questions about the supporting data.

Mangia, mangia!

Having gotten our daily dose of brain food, attendees retired to

their hotels and apartments to catch up on email, clean up, and later, walk to the ristorante du jour, which had been chosen for that evening. There, we were greeted by our attentive hosts, Andrea and Daniela (accompanied by Ugo), who had arranged for a family-style dinner and wine affair, and would ensure that everyone had enough to eat and drink. If you had trekked to the meeting for the food alone, you would have not been disappointed.

"Mangia," Dani told me, gesturing emphatically with her hands and pointing to my empty plate, after the second (or was it the third?) course. "Please, you must eat some more," she insisted, passing me a bowl of mussels. It felt like a family gathering—a small but

mighty band of passionate, geeky divers, who were there to celebrate and improve their underwater practice. And, the eating and drinking and sharing of stories continued into the night. ■

Michael Menduno is an award-winning reporter and technologist based in California, USA, who has written about diving and diving technology for over 25 years and coined the term "technical diving." He was the founder and publisher of aquaCORPS: The Journal for Technical Diving (1990-1996), which helped usher technical diving into the mainstream of sports diving, and organized the first Tek, EUROtek and AsiaTek conferences, as well as Rebreather Forums 1 and 2.

Rebreather Meeting Presenters: Dott. Pasquale Longobardi, president of SIMSI; Dott. Alessandro Marroni, president of DAN

Europe; Dr Simon Mitchell, professor of anesthesiology, University of Auckland, New Zealand; Shearwater founder Bruce Partridge; Edoardo Pavia, owner of Sea Dweller Divers; DAN Europe research supervisor Massimo Pieri; Dr Neal Pollock, research chair in hyperbaric and diving medicine at Université Laval; TDI instructor trainer Mark Powell; Tomasz Stachura, CEO of SANTI

For more information, visit: ponzadiving.com